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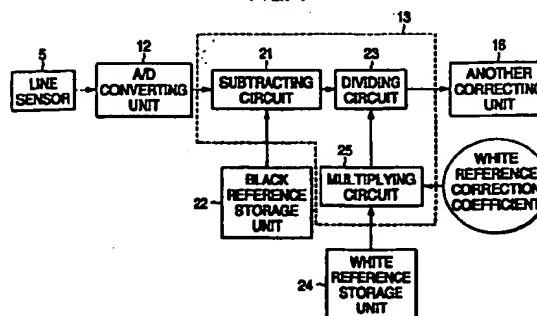
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(54) Shading correction for an image scanner

(57) An image reading apparatus includes: a line sensor 5 for converting light from an original into an electric signal; an A/D converting unit 12 for converting the electric signal derived from the line sensor 5 into a digital signal; a white reference storage unit 24 for storing white reference data set before the original is read; a black reference storage unit 22 for storing black reference data set before the original is read; a light-source light amount detecting unit for detecting a light amount of a light source; and a shading correcting unit 13 for shading-correcting an output signal derived from the A/D converting unit 12 with employment of both white reference data corrected by a white reference correction coefficient and the black reference data. As a consequence, the shading corrections can be performed along both a main scanning direction and a sub-scanning direction. Also, an image reading method includes: a) a step for detecting and setting sub-scanning white reference data when white reference data used in a shading correction is set; b) a step for detecting sub-scanning white reference data in each of reading lines; c) a step for setting as a white reference correction coefficient a ratio of a difference between the sub-scanning white reference data when said white reference data is set and black reference data to another difference between said sub-scanning white reference data in the respective reading lines and said black reference data; and d) a step for reading the original while executing a

shading correction with employment of white reference data corrected by the white reference correction coefficient. In this image reading method, in the case where a plurality of the originals are read, the above-described steps b), c), and d) are repeatedly performed. As a result, since the setting operation for setting again the white reference data can be omitted, the time period required to read the image can be shortened.

FIG. 1





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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE 40 20 817 A (TOSHIBA KAWASAKI KK) 10 January 1991	1,4	H04N1/401
A	* abstract; figures 1-20 * * column 7, line 45 - column 9, line 61 *	2,3,5-9	
A	EP 0 439 358 A (HEWLETT PACKARD CO) 31 July 1991 * abstract; figures 4,5,7 *	1,4	
A	EP 0 439 357 A (HEWLETT PACKARD CO) 31 July 1991 * abstract; figures 4,7,9 *	1,4	
A	GB 2 110 899 A (XEROX CORP) 22 June 1983 * the whole document *	1,4	
A	US 5 151 796 A (ITO YASUO ET AL) 29 September 1992 * abstract; figures 1-15 * * column 3, line 47 - line 60 * * column 4, line 59 - column 5, line 3 *	1,4	
A	EP 0 552 849 A (CANON KK) 28 July 1993		TECHNICAL FIELDS SEARCHED (Int.Cl.6) H04N
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 29 June 1999	Examiner Kassow, H
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 10 5641

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29-06-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4020817 A	10-01-1991	JP 3035233 A	15-02-1991
		US 5099341 A	24-03-1992
EP 0439358 A	31-07-1991	DE 69118217 D	02-05-1996
		DE 69118217 T	22-08-1996
		JP 4212560 A	04-08-1992
		US 5278674 A	11-01-1994
EP 0439357 A	31-07-1991	DE 69126895 D	28-08-1997
		DE 69126895 T	20-11-1997
		JP 4213272 A	04-08-1992
		US 5285293 A	08-02-1994
GB 2110899 A	22-06-1983	US 4404597 A	13-09-1983
		DE 3239851 A	16-06-1983
		JP 1735916 C	26-02-1993
		JP 4015663 B	18-03-1992
		JP 58099070 A	13-06-1983
US 5151796 A	29-09-1992	JP 2254863 A	15-10-1990
		JP 3004676 A	10-01-1991
		JP 3004677 A	10-01-1991
EP 0552849 A	28-07-1993	JP 2682982 B	26-11-1997
		JP 63276970 A	15-11-1988
		JP 63276971 A	15-11-1988
		JP 63276972 A	15-11-1988
		CA 1316207 A	13-04-1993
		DE 3853439 D	04-05-1995
		DE 3853439 T	14-09-1995
		EP 0276126 A	27-07-1988
		EP 0830012 A	18-03-1998
		US 5121230 A	09-06-1992
		US 5596427 A	21-01-1997
		US 5748335 A	05-05-1998

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